

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>617916-6</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/US 00/ 15362</b>	International filing date (day/month/year) <b>01/06/2000</b>	(Earliest) Priority Date (day/month/year) <b>02/06/1999</b>
Applicant  <b>THE BOARD OF REGENTS OF THE UNIVERSITY OF OKLAHOMA</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 5 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

## 1. Basis of the report

- a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (see Box II).

## 4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

## 5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

## 6. The figure of the drawings to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1  
☐ Non of the figures.

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC 7 C01B31/02 B01J23/86

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C01B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

WPI Data, PAJ, INSPEC, COMPENDEX, EPO-Internal, CHEM ABS Data

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	KITIYANAN B ET AL: "Controlled production of single-wall carbon nanotubes by catalytic decomposition of CO on bimetallic Co-Mo catalysts" CHEMICAL PHYSICS LETTERS, 4 FEB. 2000, ELSEVIER, NETHERLANDS, vol. 317, no. 3-5, pages 497-503, XP002149234 ISSN: 0009-2614 the whole document  —  -/-	1-52



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

\* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

4 October 2000

Date of mailing of the international search report

17/10/2000

Name and mailing address of the ISA

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>DATABASE WPI  Section Ch, Week 199931  Derwent Publications Ltd., London, GB;  Class E36, AN 1999-366878  XP002149235  &amp; JP 11 139815 A (CANON KK),  25 May 1999 (1999-05-25)</p> <p>abstract</p>	<p>1-5, 10,  13-16,  18, 19,  25,  28-30,  32,  39-42,  49, 52</p>
A		<p>6, 7, 43,  44</p>
X	<p>BROTONS, V. ET AL: "Catalytic influence  of bimetallic phases for the synthesis of  single-walled carbon nanotubes"  J. MOL. CATAL. A: CHEM. (1997), 116(3),  397-403,  1997, XP000951417  the whole document</p>	<p>39-41, 52</p>
A		<p>1</p>
P, X	<p>WO 00 17102 A (WILLIAM MARSH RICE  UNIVERSITY) 30 March 2000 (2000-03-30)</p> <p>claims 1-5, 9-15  page 9, line 3 - line 18  page 10, line 15 - line 23</p>	<p>1-6, 10,  13-30,  32,  39-43,  47-49, 52</p>
P, X	<p>WILLEMS, I. ET AL: "Control of the outer  diameter of thin carbon nanotubes  synthesized by catalytic decomposition of  hydrocarbons"  CHEM. PHYS. LETT. (2000), 317(1,2), 71-76  , 28 January 2000 (2000-01-28), XP000951419  the whole document</p>	<p>39-45,  49, 52</p>
P, A		<p>1-8, 11,  13-16,  18, 26</p>
X	<p>CHE G ET AL: "CHEMICAL VAPOR DEPOSITION  BASED SYNTHESIS OF CARBON NANOTUBES AND  NANOFIBERS USING A TEMPLATE METHOD"  CHEMISTRY OF MATERIALS, US, AMERICAN  CHEMICAL SOCIETY, WASHINGTON,  vol. 10, no. 1, 1998, pages 260-267,  XP000776644  ISSN: 0897-4756  the whole document</p>	<p>49, 52</p>

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>CHEN P ET AL: "Growth of carbon nanotubes by catalytic decomposition of CH<sub>4</sub> or CO on A Ni-MgO Catalyst"</p> <p>CARBON,US,ELSEVIER SCIENCE PUBLISHING, NEW YORK, NY,</p> <p>vol. 35, no. 10-11, 1997, pages 1495-1501, XP004098170</p> <p>ISSN: 0008-6223</p> <p>the whole document</p>	49,52
X	<p>GOVINDARAJ A ET AL: "Carbon Structures Obtained By the Disproportionation of Carbon Monoxide over Nickel Catalysts"</p> <p>MATERIALS RESEARCH BULLETIN,US,ELSEVIER SCIENCE PUBLISHING, NEW YORK,</p> <p>vol. 33, no. 4, 1 April 1998 (1998-04-01), pages 663-667, XP004127706</p> <p>ISSN: 0025-5408</p> <p>the whole document</p>	49,52
X	<p>HERNADI K ET AL: "Catalytic synthesis of carbon nanotubes using zeolite support"</p> <p>ZEOLITES,US,ELSEVIER SCIENCE PUBLISHING,</p> <p>vol. 17, no. 5-6,</p> <p>12 November 1996 (1996-11-12), pages 416-423, XP004072294</p> <p>ISSN: 0144-2449</p> <p>the whole document</p>	49,52
X	<p>FONSECA A ET AL: "SYNTHESIS OF SINGLE- AND MULTI-WALL CARBON NANOTUBES OVER SUPPORTED CATALYSTS"</p> <p>APPLIED PHYSICS A: MATERIALS SCIENCE AND PROCESSING,DE,SPRINGER VERLAG, BERLIN,</p> <p>vol. 67, no. 1, July 1998 (1998-07), pages 11-22, XP000869541</p> <p>ISSN: 0947-8396</p> <p>the whole document</p>	49,52
X	<p>HAFNER J H ET AL: "CATALYTIC GROWTH OF SINGLE-WALL CARBON NANOTUBES FROM METAL PARTICLES"</p> <p>CHEMICAL PHYSICS LETTERS,NL,AMSTERDAM,</p> <p>vol. 296, no. 1/02,</p> <p>30 October 1998 (1998-10-30), pages 195-202, XP000869784</p> <p>the whole document</p>	49,52

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, X	CASSELL A M ET AL: "Large scale CVD synthesis of single-walled carbon nanotubes" JOURNAL OF PHYSICAL CHEMISTRY B, 5 AUG. 1999, ACS, USA, vol. 103, no. 31, pages 6484-6492, XP000950027 ISSN: 1089-5647 the whole document	49, 52

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 11139815 A	25-05-1999	NONE	
WO 0017102 A	30-03-2000	AU 6148499 A	10-04-2000